Design and Scale Model of Wave Generator for the Testing of Wave Energy Conversion Devices

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As the climate crisis draws more concern, research and development in wave energy as a renewable energy source has increased. Devices such as wave energy converters (WECs) are being researched, tested, and implemented to make wave energy a competitive power source. Testing of these devices is limited due to environmental concerns such as weather, location, and other issues. WECs require testing in a marine environment, however, performing testing in the actual environment may be difficult due to weather, access, mounting, and other issues. To eliminate environmental unknowns from testing, a wave simulator device can mimic wave behavior without the need for ocean or river testing. After doing research on wave energy and existing solutions, a wave generator device was conceptualized and designed to be used in Cal Poly's Fluids Lab. A scale model was manufactured to replicate the full-scale design as a proof-of-concept prototype which validated the wave generator mechanism and design layout. The design concept and objective of simulating ocean waves is proven through the scale model and planned to be constructed by future Senior Design Project teams. The wave simulator device will be utilized by Cal Poly students, faculty, or affiliates to test different types of WECs.

A Thesis Defense in Mechanical Engineering

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